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$$=\frac{i(i-1)(i-2)(i-3)\ldots\ldots(i-s_1+2)}{\underline{|s_1-1}}(s_1-1-(s_1-2))$$

$$=\frac{i(i-1)(i-2)(i-3)\ldots\ldots(i-s_1+2)}{\underline{|s_1-1}}.1.$$

In a similar manner, it can be proven that

$$C^{i\,0}_{s_1}\left\{\begin{matrix} s_2 & r_3+2 \\ 0 & 0 \end{matrix}\right\}=\frac{i(i-1)(i-2)(i-3)\ldots\ldots(i-s_1+2)}{\underline{|s_1-1}}(s_1-2)$$

$$C^{i\,0}_{s_1}\left\{\begin{matrix} s_2 & r_3+3 \\ 0 & 0 \end{matrix}\right\}=\frac{i(i-1)(i-2)(i-3)\ldots\ldots(i-s_1+2)}{\underline{|s_1-1}}\,\frac{(s_1-2)\,(s_1-3)}{\underline{|2}},$$

or, in general,

$$C^{i\,0}_{s_1}\left\{\begin{matrix} s_2 & s_3 \\ 0 & 0 \end{matrix}\right\}=\frac{i(i-1)(i-2)(i-3)\ldots\ldots(i-s_1+2)}{\underline{|s_1-1}}$$

$$\times\frac{(s_1-2)\,(s_1-3)\ldots\ldots(s_1-s_3+r_3-2)}{\underline{|s_3-r_3-1}}.$$

SYRACUSE UNIVERSITY, *December 18, 1902.*

AN ACCOUNT OF PROFESSOR RUNKLE'S MATHEMATICAL MONTHLY.

BY PROFESSOR SIMON NEWCOMB.

I first made Mr. Runkle's acquaintance in the winter of 1857, when he was senior assistant in the Nautical Almanac Office, then at Cambridge, Mass. His intelligence, intellectual activity, and lively interest in matters and things generally, not excluding things political, made him a very interesting character.

It was early in 1858 that he announced to me and some others in the office his intention of starting a mathematical journal. His first step was to secure the necessary support. It may be feared that few in our day have an adequate conception of the backward condition of mathematical study in our country at that time. A curious illustration is offered by Davies' well-known dictionary of mathematics, in the preface of which it was announced that it contained definitions of all the terms used in mathematics. The word "determinant" does not, however, occur in the dictionary, nor any terms used in the branches of algebra with which determinants would be associated. So far as I know, the first person in our country to know that a determinant existed, or to become acquainted with a paper in any European mathematical journal, was Prof. Benj. Peirce. Cayley and Sylvester were then at the height of their activity in developing the newer theories, but Peirce was the only one among us who had the slightest idea what they were working at.

Such was the field in which Runkle proposed to sow the seeds of what might be considered a new branch of learning. His circulars were sent to all the leading mathematical professors in the country and others interested in the subject. The responses were such as to justify his going on with the undertaking, although the problem of making a respectable standard compatible with the necessary pecuniary support was a very doubtful one.

The first number was issued in January, 1859, and showed an attempt to compromise between the two difficulties. Its most marked feature, and one which seemed admirably adapted to make it conducive to the advancement of mathematical science, was the prize problem for students. These were of various degrees of simplicity, though all were above the school-boy standard. A first prize was offered for the best solution, and a second prize for the next best. Prize essays were also invited. One of the problems of the first number, which related to a theorem regarding the intersection of circles, brought out a short paper from Cayley, in which he extended the theorem to conics.

The Memoir which won the first prize was by G. W. Hill, on a subject relating to the theory of the figure of the earth. It was almost his first paper published, but showed unmistakably the hand of the master.

The prizes were awarded on the recommendation of a committee to whom the solutions were submitted. Professor Winlock was the first chairman of the committee, but soon retired from it, and the solutions were afterwards passed upon by W. P. G. Bartlett and myself.

Bartlett was a man whose untimely death was a great loss for mathematical science in our country. He was not only of the first order of ability, but an enthusiastic devotee of mathematical study, whose character and standard were in every respect the highest. He was a nephew of the eminent lawyer, Mr. Sidney Bartlett, long a leader of the Boston bar. One day when his uncle urged him to undertake the profession of law in order to secure wealth and position in society, he replied: "If I can secure a high position in the regard of Pierce, Cayley, Sylvester, and fifteen or twenty other men like them, I shall value it more than any opinion that society at large can form of me."

Although not formally connected with the responsible editorship, Bartlett and myself naturally acted as general advisers and referees on matters connected with the Journal.

Among our amusing experiences was one with a Pennsylvania politician of prominence in the State, who had written and read before a Teachers' Association a long and rambling essay on the then celebrated problem of the oxen and the field of grass. Not knowing what to do with the paper, the Association referred it to the editor of the Mathematical Monthly, by whom it was consigned to the waste basket. This was a great humiliation to the honorable gentleman, who, from the high office which he held in Washington, opened up a correspondence with the editor. The outcome of it was a great reduction in its length by the author and a subsequent abbreviation by the editor, which reduced it to four pages, and then it was printed, much to Bartlett's disgust.

On another occasion a professor somewhere in the South sent a paper, much of which was extracted, almost verbatim so far as the formulæ went, from Walton's Problems of Mechanics. The question arose how to let the man know, in the gentlest way, that we had detected the fraud. Bartlett's advice was characteristic: "Just write to him that we don't publish stolen articles." I suggested that it would suffice to let him understand in the gentlest way that we knew where the matter came from. This Runkle did, calling his attention to the similarity of his paper to the book of Walton, with which the professor was probably not acquainted. The answer showed that we had mistaken our man. He assured us that he had a copy of Walton and knew all about the matter, and did not think the resemblance was any objection to his paper. There was an added intimation that, while he should be glad to write for the Journal, he had no time to spend in writing rejected articles.

It was soon found that the conduct of the Journal was beset with even greater difficulties than those of dealing with would-be contributors. Unsustained by any public body, it needed a good list of subscribers to be self-supporting. Between the highest grade of mathematics that could be understood by a sufficient number of professors and students in our country at that time, and the lowest that would be of interest to the professional mathematician, there was a very wide gap. In trying to fill it, complaints were heard on the one side that the papers were too difficult to be understood, and, on the other side, that the standard was too low for a journal which was really to promote the advancement of mathematics.

Yet another question was whether it would be allowable to go outside its proper field for the sake of enlarging its sphere of readers. In one of its early numbers was published a paper by Geo. P. Bond on Donati's Comet which, being the first scientific description of that brilliant object to which the public had access, did a great deal to excite interest in the Journal. It thus lost the support of no less a personage than Professor Peirce, who held that the Journal had no right to go outside its proper field.

At the end of the year 1860 three annual volumes had been published. The Civil War was then imminent and public conditions such that the thought of continuing the enterprise had to be abandoned. The historic value of the publication, I think, can not be doubted. Its contents were more varied and interesting, and low though its standard might have been when we measure it by that of the foreign journals, in contained more varied matter of interest to the student, even of today, than any American mathematical journal that had preceded it. Its great mission, which it successfully fulfilled, was to interest our college men in the subject. Although we do not find among its contributors the names of any who, in recent times, have become prominent as mathematical investigators, I believe that the stimulus it gave to the study of the subject may have been an important factor in the serious advance which commenced fifteen years later at the Johns Hopkins and other of our great universities.

THE AYER PAPYRUS.*

Edited by EDGAR J. GOODSPEED.

In the Eygptian Room of the Field Columbian Museum, Chicago, there is a Greek papyrus of much mathematical interest. It preserves a series of geometrical processes, in which the areas of various quadrilaterals are determined by methods much less advanced than those of Euclid. The papyrus measures cm. 21.3 x 40.5. Originally it formed part of a roll, written in clear uncial characters on one side only, the writing being in columns. Parts of three columns remain, the second and third being nearly complete, while of the first there are but a few scattered words. The uniformity of the language used, and the preservation of three out of the four figures illustrating the processes of these two columns make their restoration easy and certain. The papyrus comes from the Fayûm, and was brought from Egypt to the Field Museum by Mr. Ed. E. Ayer, of Chicago, in 1895. It belongs to the first century after Christ, but the methods pursued in the calculations, and the senses in which certain terms are used carry back the probable date of the work into pre-christian times and suggest relationship with the school of Heron of Alexandria. The work was apparently a practical treatise on mensuration, designed for use in re-surveying farm-lands of irregular shape, after the annual inundation.

Geometrical figures illustrating the proceses described are appended to them. These figures are covered by numerals indicative of the length of each side, part of a side, and perpendicular, and of the area of each section. It will be observed that in the papyrus these figures are very roughly drawn, and by no means satisfy the proportions thus prescribed for them. For the restoration of the second figure, which is missing from the papyrus through mutilation at that point, I am indebted to Professor E. H. Moore. It should be noted that the word translated "acre" is the Greek "aroura," which is strictly equivalent to about two-thirds of the English acre.

The processes, literally translated, are as follows:

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*For the Greek text see Edgar J. Goodspeed, *American Journal of Philology*, Vol. XIX, pp. 25-39.